# SECTION 704
# STONE AND CRUSHED AGGREGATE

**704.1-STONE FOR MASONRY**:

Stone for coursed masonry shall be tough, sound and durable, resistant to weathering action, reasonably fine grained, uniform in color, and free from seams, cracks, pyrite inclusions or other structural defects. The stone shall have a compressive strength of not less than 5,000 psi (34.5 MPa). Stone shall be of such character that it can be truly wrought to such lines and surfaces as may be required.

**704.2-STONE FOR RIPRAP:**

Stone of riprap shall consist of field stone or roughunhewn quarry stone as nearly rectangular in section as is practicable. The material shall have a maximum weighted loss of 30 percent when subjected to five cycles of sodium sulfate soundness test, MP 703.00.22.

**704.3-STONE FOR GABIONS:**

Material for gabions shall consist of rock, field stone, unhewn quarry stone or river bed stone. The dimensions of the rock or stone fillings shall be such as to prevent loss of material through mesh openings and accomplish a mass with a minimum amount of voids. The material shall have a maximum weighted loss of 30 percent when subjected to five cycles of sodium sulfate soundless test, MP 703.00.22.

**704.4-DUMPED ROCK GUTTER:**

The material for dumped rock gutter shall be rock containing a combined total of not more than 15 percent other suitable material, as determined by visual inspection.

Visual inspection shall be used to determine that the rock will conform to the following weight requirements:

| **Thickness of Gutter Feet (mm)** | **70 Percent of the Weight of Material Shall Consist of Stones Weighin Between the Following Limits:** |
|---|---|
| 1 (300 mm) | 50-100 lb. (20-45 kg) |
| 1.5 (450 mm) | 60-150 lb. (25-70 kg) |
| 2.0 (600 mm) | 75-200 lb. (30-90 kg) |
| 2.5 (750 mm) | 100-250 (45-115 kg) |

**704.5-SPECIAL ROCK FILL:**

Special rock fill shall be limestone or sandstone having a maximum weighted loss of 30 percent when subjected to five cycles of sodium sulfate soundness test, MP 703.00.22. Metallurgical slag or broken concrete, from a source approved by the Engineer, may be furnished.

The rock shall have the dimensions in accordance with the Contract Documents. This slab-like pieces shall not be used.

**704.6-AGGREGATE FOR BASE OR SUBBASE COURSE:**

**704.6.1-General:** The material shall consist of gravel, crushed gravel, crushed stone, crushed slag, or any combination of these materials uniformly blended to conform to the requirements of 704.6.2, with the following exception: Los Angeles abrasion is not required for blast furnace slag. Natural or manufactured sand may be used as a component of the blend. Crushed slag shall meet the requirements of 703.3 with the exception of the third and fifth sentences. When gravel is to be used in stabilized (treated) base or subbase construction, it need not be crushed. When used in an unstabilized base or subbase construction, the gravel shall be crushed as specified.

When the Contractor elects to blend materials, each component of the blend shall meet the quality requirements of 704.6.2. Blade or road mixing will not be allowed.

When shoulders are specified, natural sand may not be used as a shoulder component.

**704.6.2-Gradation, Quality, and Crushed Particle Requirements:**

Material shall be sampled in accordance with MP 700.00.06, Aggregate Sampling Procedures.

When gravel is used in an unstabilized condition and in combination with other types of aggregate, it shall produce a combined material having a minimum of 80 percent one-face fracture as determined by weight of particles retained on the No. 4 (4.75 mm) sieve. When gravel is used in anunstabilized condition and alone, it shall have a minimum of 80 percent one-face fracture as determined by weight of particles retained on the No. 4 (4.75 mm) sieve.

**704.6.3-Sampling, Testing and Acceptance Procedure:** Material shall be sampled in accordance with MP 700.00.06 Aggregate Sampling procedures. Frequency of sampling and testing and plotting of gradation test data will be in accordance with established Division procedures.

Material failing to comply with the Specification requirements when sampled, tested, and evaluated in accordance with the above Division procedures shall be removed and replaced at the Contractor's expense, or, at the option of the Engineer, may be left in place with reduced payment.

## TABLE 704.6.2A – GRADATION REQUIREMENTS

| Gradation Amounts Finer Than Each Laboratory Sieve (Square Openings), % By Weight | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Aggr. class** | **8" (200)** | **2½" (63)** | **2" (50)** | **1½" (37.5)** | **3/4" (19)** | **#4 (4.75)** | **#40 (42.5 µm)** | **#100 (150 µm)** | **#200 (75 µm)** |
| 1 | | | | 100 | 50-90 | 20-50 | 5-20 | | 0-7 |
| 2 | | | | 100 | 80-100 | 35-75 | 10-30 | | 0-10 |
| 4 | | | | 100 | 50-95 | 20-60 | 5-35 | | |
| 5 | | | 100 | | | 30-90 | | | 0-25 |
| 6 | | | | 100 | 50-100 | 25-70 | 10-45 | 3-28 | |
| 7 | 90-100 | | 0-5 | with intermediate sizes between 6" (150 mm) and 4" (100 mm) represented | | | | | 30 |
| 8 | | | | 100 | 80-100 | 35-75 | 10-40 | | 4-14 |
| 9 | | 100 | | 80-95 | 50-70 | 20-40 | | 0-8 | |

## TABLE 704.6.2B - QUALITY REQUIREMENTS

| Aggr. class | Los Angeles Abrasion, Percent, Max. | Sodium Sulphate Soundness, Percent Max. | Liquid Limit Max. | Plasticity Index, Max. | Deleterious Material Percent Max. |
|---|---|---|---|---|---|
| 1 | 50 | 12 | 25 | 6 | 5 |
| 2 | 50- | 12 | 25 | 6 | 5 |
| 4 | **Note 1** | | 25 | 6 | 5 |
| 5 | | | 25 | 6 | 5 |
| 6 | | 30 | 25 | 6 | 5 |
| 7 | | | | | 10 (by visual observation) |
| 8 | 50 | 12 | 25 | 6 | 5 |
| 9 | 50 | 12 | 25 | 6 | 5 |

**Note 1:** The Los Angeles Abrasion value of aggregate comprising the base course shall be treated in the manner hereinafter set forth to determine the specification requirement for the item:

**Los Angeles Abrasion Value Assigned** } **Aggregate**

LA≤50
50<LA≤65
65<LA≤80
80<LA

} **Stabilization Requirements**

None
Top 4 inches (100 mm)
Top 6 inches (150 mm)
Top 8 inches (200 mm)

**704.6.4**

Stabilization shall be accomplished with bituminous material or portland cement in accordance with the applicable sections of these Specifications. When the depth indicated above exceeds the Plan depth for the item, the depth to be stabilized shall be the Plan depth. In the event the Contractor elects to stabilize the material, no separate payment will be made for the cost of such stabilization.

If aggregates are blended to produce the base course material, the Los Angeles Abrasion Value used to determine the stabilization requirements shall be the highest value obtained from testing the individual components of the blend.

**704.6.4-Test Methods:**

| | |
|---|---|
| Los Angeles Abrasion | AASHTO T 96, ASTM 535 |
| Soundness<br>(Sodium Sulphate, 5 cycles) | MP 703.00.22 |
| Liquid Limit | AASHTO T 89 |
| Plasticity Index | AASHTO T 90 |
| Deleterious Materials | ASTM C 295, MP 703.01.20,<br>MP 702.01.20, MP 703.00.27 |
| Gradation | AASHTO T 11 and T 27 |

**704.7-FILTER MATERIAL:**

Filter material shall consist of sand, other approved inert material, or a combination thereof, having hard, strong, durable particles. The material shall contain not more than a total of five percent coal, clay lumps, shale, soft fragments, organic matter, and other local deleterious substances.

The material shall conform to the following gradation:

| **U.S. Standard Sieve Size** | **Percent Passing, by Weight** |
|---|---|
| 2 in. (50 mm) | 100 |
| No. 4 (4.75 µm) | 65-100 |
| No. 40(4.25 µm) | 25-50 |
| No. 200 (75 µm) | 0-25 |

**704.8-SHOT ROCK:**

Shot rock shall be limestone, sandstone, or other inorganic material acceptable to the Division, having dimensions similar to that which exists after final blasting at the quarry site and prior to crushing. It shall contain material